

1. An apparatus for chlorine dioxide generation, the apparatus comprising:

- a plurality of metering pumps;
- a reaction column having multiple inlet ports; and
- a synchronizer controlling the metering pumps to provide synchronized delivery of a plurality of reactant chemicals to the reaction column.

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2. The apparatus of claim 1, the reaction column further configured to have a plurality of tee shaped internal passages;

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3. The apparatus of claim 2, wherein the tee shaped passages are configured to introduce a plurality of reactant chemicals capable of forming chlorine dioxide to each other.

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4. The apparatus of claim 3, the tee shaped passages further configured to promote mixing of the reactant chemicals.

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5. The apparatus of claim 4, wherein the tee shaped passages promote mixing of the reactant chemicals by providing at least one head on collision of the reactant chemicals.

6. The apparatus of claim 5, wherein the tee shaped passages further promote mixing of the reactant chemicals by generating turbulent flow in reactant chemicals by providing abrupt changes in the flow path.

7. The apparatus of claim 6, wherein the reactant chemicals react in a first and a second reaction.

8. The apparatus of claim 7, wherein the first reaction involves the reaction of
5 two of the reactant chemicals to form chlorine gas.

9. The apparatus of claim 8, wherein the second reaction involves the reaction between the chlorine gas and an additional reactant chemical to form chlorine dioxide.

10. The apparatus of claim 9, wherein the first and second reactions occur under a vacuum created by a carrier fluid flowing through an eductor.

11. The apparatus of claim 10, wherein the carrier fluid comprises water.

12. The apparatus of claim 1, wherein the synchronized delivery further comprises a repeat cycle timer to ensure that all the metering pumps pulsations are synchronized to occur at the same time.

13. An apparatus for chlorine dioxide generation, the apparatus comprising:
a reaction column configured to have multiple inlet ports and a plurality of
tee shaped internal passages;
the tee shaped passages configured to introduce a plurality of reactant
chemicals to each other; and
5 the tee shaped passages further configured to promote turbulent mixing of the
reactant chemicals.

14. The apparatus of claim 13, wherein the tee shaped passages promote mixing
of the reactant chemicals by providing at least one head on collision of the reactant
chemicals.

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15. The apparatus of claim 14, wherein the tee shaped passages further promote
mixing of the reactant chemicals by generating turbulent flow in reactant chemicals by
providing abrupt changes in the flow path.

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16. A method for generating chlorine, the method comprising:
providing a plurality of metering pumps;
providing a reaction column having multiple inlet ports; and
synchronizing the action of the metering pumps to provide a synchronized
delivery of a plurality of reactant chemicals the reaction column.

17. The method of claim 16, wherein selecting reaction column further comprises selecting a reaction column with a plurality of tee shaped internal passages;

18. The method of claim 17, wherein the tee shaped passages are configured to
5 introduce a plurality of reactant chemicals capable of forming chlorine dioxide to each other.

19. The method of claim 18, the tee shaped passages further configured to promote mixing of the reactant chemicals.

10 20. The method of claim 19, wherein the tee shaped passages promote mixing of the reactant chemicals by providing at least one head on collision of the reactant chemicals.

21. The method of claim 20, wherein the tee shaped passages further promote mixing of the reactant chemicals by generating turbulent flow in reactant chemicals by providing abrupt changes in the flow path.

22. The method of claim 21, wherein the reactant chemicals react in a first and a second reaction.

20 23. The method of claim 22, wherein the first reaction involves the reaction of
two of the reactant chemicals to form chlorine gas.

24. The method of claim 23, wherein the second reaction involves the reaction between the chlorine gas and an additional reactant chemical to form chlorine dioxide.

25. The method of claim 24, wherein the first and second reactions occur under
5 a vacuum created by a carrier fluid flowing through an eductor.

26. The method of claim 25, wherein the carrier fluid is selected to be water.

27. The method of claim 16, wherein synchronizing the delivery further
10 comprises providing a repeat cycle timer to ensure that all the metering pumps pulsations are
synchronized to occur at the same time.

29. The method of claim 28, wherein the tee shaped passages promote mixing of the reactant chemicals by providing at least one head on collision of the reactant chemicals.

30. The method of claim 29, wherein the tee shaped passages further promote mixing of the reactant chemicals by generating turbulent flow in reactant chemicals by providing abrupt changes in the flow path.

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